

## Human Immunodeficiency Virus and Its Co-Relation with Thyroid Levels and Cd4 Count

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**Abstract:** Thyroid dysfunction has been reported in human immunodeficiency virus (HIV)-infected individuals including children. Some studies have reported that thyroid dysfunction may be a marker of severity or progression of HIV. HIV infection is associated with multiple organ involvement including the endocrine system. In autopsy studies, adrenal gland is the most commonly involved endocrine gland in the body, but clinical adrenal dysfunction is uncommon, likewise clinical thyroid disorder is rare but altered Thyroid function is common. A high prevalence of abnormalities in thyroid function tests among HIV infected adults has been noted in previous cross sectional studies. In addition, this thyroid dysfunction correlated with advancement of the infection in conjunction with lowering CD4 cell counts. Subtle alterations in thyroid function tests are more common in HIV infection and at times detectable in the early phase of disease and as well as in late phases The thyroid function changes are HIV specific and are consistent with an abnormal response to acute illness. However there is paucity of Indian studies that are needed to evaluate the thyroid dysfunction in HIV infected patients and their clinical correlation.

Hence this study is undertaken to study the thyroid dysfunction in HIV seropositive patients and correlate with the clinical features

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### I. Introduction

HIV is a global pandemic with cases reported from virtually every country with 36.9 million people living with AIDS/HIV in 2017. 9,40,000 deaths in 2017 due to AIDS, and each day almost 7000 people get newly infected. Globally estimated incidence is around 1.6 million among adults (WHO 2017).

Thyroid function may be altered in 10-15% of patients with HIV infection.<sup>4</sup> Both hypothyroidism and hyperthyroidism may be seen. The predominant abnormality is Subclinical hypothyroidism. In the setting of HAART up to 10% of patients have been noted to have elevated TSH levels, suggesting that this may be a manifestation of immune reconstitution.<sup>5</sup> In advance HIV disease, infection of thyroid gland may occur with opportunistic pathogens, including P. Jiroveci, CMV, mycobacteria, toxoplasma gondii, & Cryptococcus neoformis.<sup>5</sup>

Subclinical hypothyroidism is defined as an elevated serum TSH level with normal free thyroid hormone values. The prevalence of subclinical hypothyroidism is 4 to 8 percent in the general population, and up to 15 to 18 percent in women who are older than 60 years.<sup>6</sup> The use of HAART in current clinical practice has been associated with benefits in the management of HIV infection, with a dramatic reduction in HIV-related morbidity and mortality. Several and at times unexpected side effects, which may limit long-term HAART tolerability and efficacy, have been described: abnormalities of lipid, glucose and bone metabolism are increasingly being recognized, including hyperlipidemia, hyperinsulinaemia, impaired glucose tolerance, diabetes mellitus, lipodystrophy syndrome and reduced bone mineral density.<sup>7,8</sup> In the past few years, several cases of thyroid, adrenal and gonadal dysfunction have been observed, suggesting a possible effect of HIV and/or antiretroviral drugs on the endocrine system. With regard to thyroid function, a higher prevalence of subclinical hypothyroidism compared with the general population has been described.<sup>6</sup>

## II. Material And Methods

### Source of data

The present study conducted on 100 diagnosed patients of HIV and fulfill inclusion and exclusion criteria, getting admitted to Basaveshwar Teaching and General Hospital, Kalaburgi, Karnataka.

**Study design:** Descriptive study.

**Duration of study:** September 2017 to June 2019.

**Sample size:** 100

**Subjects:** Study subjects selected after applying inclusion-exclusion criteria. Information is collected through prepared proforma from each patient

### Inclusion Criteria

All symptomatic HIV positive adult patients (Serology positive) attending out-patient and also among in-patients of Department of Medicine in M R MEDICAL COLLEGE KALBURGI attached to basaveshwar teaching and general hospital kalaburgi

### Exclusion criteria

- Known cases of thyroid disorder.
- Patients on drugs altering thyroid hormone metabolism along with stavudine based anti-retroviral drugs.
- All Diabetics.
- Abnormal Liver function test's with SGOT/SGPT levels greater than 3 times normal range, and Abnormal Renal function tests with Serum Creatinine greater than 1.6mg%.

### Method of collection of data:

Patients selected for study according to all inclusion and exclusion criteria. The purpose of the study was explained to the patient and informed consent obtained in patient's own vernacular language.

A detailed history, clinical and laboratory data of these patients at admission recorded as per the Performa.

### Statistical Analysis

#### Statistical methods applied

Descriptive and inferential statistical analysis has been carried out in the present study. The results were analyzed by using SPSS version 18 (IBM Corporation, SPSS Inc., Chicago, IL, USA). Results on continuous measurements were presented on Mean  $\pm$  SD (Min-Max) and results on categorical measurements were presented in Frequency (Percentage). Inferential statistics like Chi-square test, Fischer-exact test was used. P value less than 0.05 was considered to be significant.

### LIMITATIONS OF STUDY:

1. Small sample size.
2. Lack of availability of Thyroid Antibodies, FREE T3 AND T4.
3. Role of Antiretroviral drug has not been evaluated

## III. Results

TABLE NO.1: AGE DISTRIBUTION OF THE STUDY SUBJECTS

Age (Years)	Frequency	Percentage
<20	5	5
21-30	11	11
31-40	38	38
41-50	31	31
51-60	10	10
>60	5	5
Total	100	100

Comments :Mean age= 40.47 $\pm$ 11.55 years

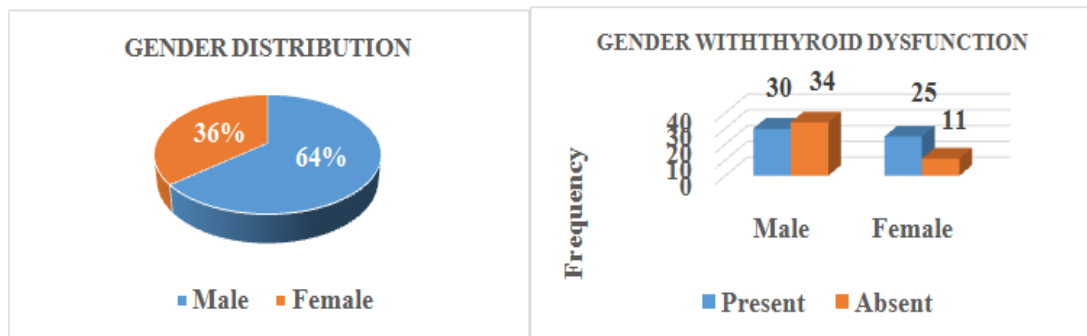
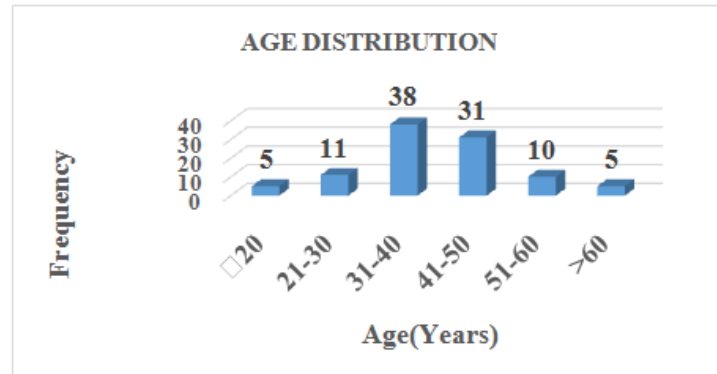


TABLE NO.2: GENDER DISTRIBUTION OF THE STUDY SUBJECTS

Gender	Frequency	Percentage
Male	64	64
Female	36	36
Total	100	100

Comments: About 64 % were males and 36 % were females.

TABLE NO.4: GENDER-WISE DISTRIBUTION OF THE STUDY SUBJECTS IN RELATION TO THYROID DYSFUNCTION

Hypothyroidism	Male n(%)	Female n(%)	Total n(%)
Present	30(30)	25(25)	55(55)
Absent	34(34)	11(11)	45(45)
Total	64(64)	36(36)	100(100)

Comment: P=0.001

The above table shows Thyroid Dysfunction in 100 patients of HIV. Among those 55 patients had Thyroid Dysfunction. Out of these 55 patients, 30 were males (30%) & 25 were females (25%). Thyroid Dysfunction was more common in male patients than female patient

TABLE NO.5: DISTRIBUTION OF HIV POSITIVE PATIENTS IN RELATION TO ABSOLUTE CD4 COUNTS

Absolute CD4 count	Male n(%)	Female n(%)	Total n(%)
<200	25(25)	12(12)	37(37)
200-500	16(16)	14(14)	30(30)
>500	23(23)	10(10)	33(33)
Total	64(64)	36(36)	100(100)

Mean CD4 count = 374.21±271.002

P=0.341

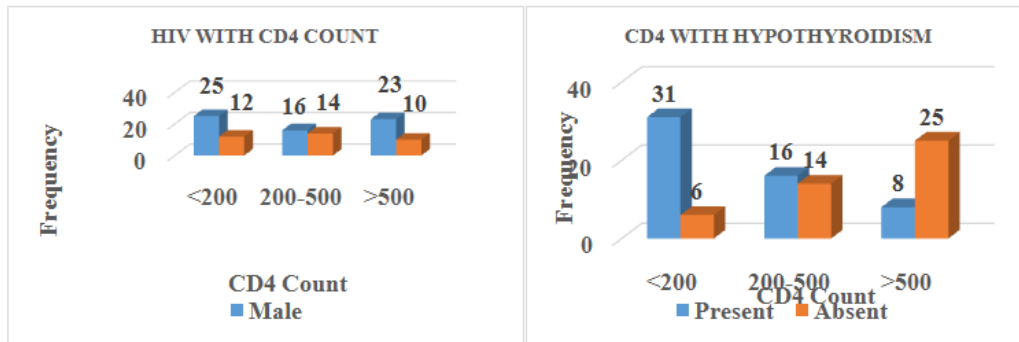


TABLE NO.6: DISTRIBUTION OF CD4 COUNT IN RELATION TO HYPOTHYROIDISM

Absolute CD4 count	Present n(%)	Absent n(%)	Total n(%)
<200	31(31)	06(6)	37(37)
200-500	16(16)	14(14)	30(30)
>500	08(8)	25(25)	33(33)
Total	55(55)	45(45)	100(100)

P=0.001

**Fisher's exact test**

The association between rows (groups) and columns (outcomes) is considered to be extremely statistically significant. Thus, there is a strong relationship between Absolute CD4count & thyroid dysfunction

TABLE NO.7: DISTRIBUTION OF T3 LEVELS IN HIV PATIENTS

T3	Males n(%)	Females n(%)	Total n(%)
≤0.6	20(20)	15(15)	35(35)
0.7-2.04	39(39)	19(19)	58(58)
≥2.05	05(5)	02(2)	07(7)
Total	64(64)	36(36)	100(100)

Mean T3 level= 1.05±0.84, P=0.564

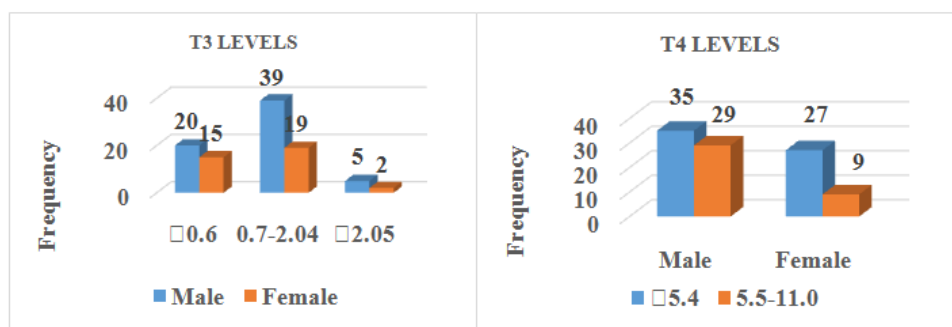


TABLE NO.8: DISTRIBUTION OF T4 LEVELS IN HIV PATIENTS

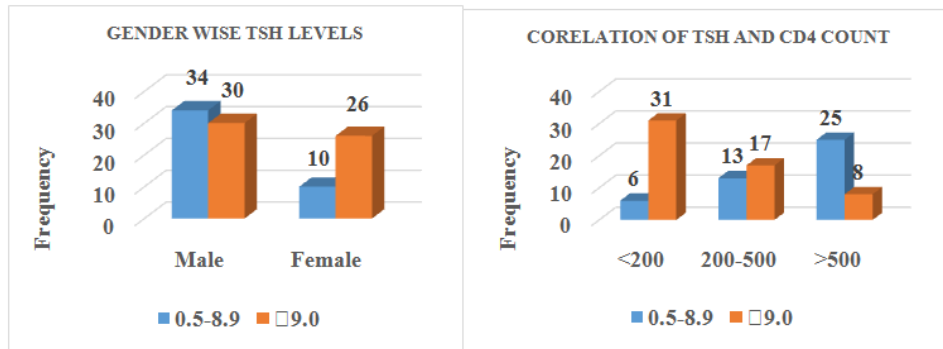
T4	Males n(%)	Females n(%)	Total n(%)
≤5.4	35(35)	27(27)	62(62)
5.5-11.0	29(29)	9(9)	38(38)
Total	64(64)	36(36)	100(100)

P=0.055 Mean T4 level= 5.61±2.13

TABLE NO.9: DISTRIBUTION OF TSH LEVELS IN HIV PATIENTS

TSH	Males n(%)	Females n(%)	Total n(%)
0.5-8.9	34(34)	10(10)	44(44)
≥9.0	30(30)	26(26)	56(56)
Total	64(64)	36(36)	100(100)

Mean TSH level = 9.34±5.78, P=0.021\*



**TABLE NO.12: DISTRIBUTION OF TSH LEVELS IN HIV PATIENTS IN CO RELATION TO CD4 COUNTS**

TSH	200 n(%)	200-500 n(%)	>500 n(%)	Total n(%)
0.5-8.9	6(6)	13(13)	25(25)	44(44)
≥9.0	31(31)	17(17)	8(8)	56(56)
<b>Total</b>	<b>37(37)</b>	<b>30(30)</b>	<b>33(33)</b>	<b>100(100)</b>

P=0.001

**TABLE NO.15: DISTRIBUTION OF STUDY SUBJECTS WITH RESPECT TO TREATMENT**

NAÏVE	Frequency	Percentage
YES	27	27
NO	73	73
<b>Total</b>	<b>100</b>	<b>100</b>

#### IV. Discussion

We have studied the thyroid profile of 100 HIV infected individuals after considering the exclusion criteria.

##### SEX DISTRIBUTION

Out of the 100 individuals 11% were between 20-30 years of age and 38% between 31-40 years. Males constituted 64% and females were 36%.

##### CATEGORYWISE DISTRIBUTION OF THYROID DYSFUNCTION

The thyroid profile studies in these patients revealed majority of the T3 values were in the normal range 0.6-2.04 (54%) with lower levels of T3 in 35% patients that is <0.06 and majority of T4 values were also on lower side <5.4 (62%) however large portion of the TSH values were above normal range >9.0 (56%) (p<0.021). Palanisamy P, Perisamy M, Uma M, Deepa M,<sup>5</sup> did a study on 150 HIV positive subjects divided into 3 groups based on CDC criteria to investigate level of serum lipids and thyroid hormones. They concluded that thyroid dysfunction is frequent in HIV infection and that with progression of disease there is a primary hypothyroid like stage that occurs in patients with HIV infection. Free T3, Free T4 and serum TSH can be used as a surrogate marker of progression of the disease

##### RELATIONSHIP OF ABSOLUTE CD4 COUNTS WITH RESPECT TO THYROID PROFILE

The CD4 count in our study had a wide range of spectrum from less than 200 to more than 500. When thyroid profile was co related with CD4 count it showed that people with higher CD4 count were having normal thyroid profile values than people with lower CD4 count. Majority of the patients that is 31% with CD4 count < 200 were having hypothyroidism and people with CD4 count 200-500 were 16% and CD4 >500 were only 8% with significant p value of P=0.001. Gagan Jain, Ganpat Devpura, BS Gupta<sup>3</sup> did a prevalence study of Thyroid function changes in HIV infection at various stages of the illness. 50 subjects belonging to both sexes, all newly diagnosed HIV positives were enrolled for the study. Results showed a direct correlation between CD4 count and Free T3 and Free T4 values and an inverse correlation of CD4 counts with serum thyroid stimulating hormone (TSH) levels. They concluded that thyroid dysfunction is frequent in HIV infection and with progression of disease there is a primary hypothyroid like stage<sup>3</sup>

## **GENDER WISE CORRELATION OF CD4 COUNT AND HYPOTHYROIDISM**

When hypothyroidism and CD4 count was co related in males and females it showed that males were affected more than females .Beltran S, Lescure FX, Desailoud R, et al<sup>6</sup> conducted a cross sectional study to determine the prevalence of and risk factors for hypothyroidism in 350 HIV infected patients grouped according to CDC staging. Results showed 16% of them having hypothyroidism:- 2.6% had overt hypothyroidism,6.6% had subclinical hypothyroidism.e prevalence of subclinical hypothyroidism was higher among HIV infected men than among HIV-infected women

## **CORELATION OF BMI WITH CD4 COUNT**

A low BMI was noted in individuals with a low CD4 count as compared to patients with higher CD4 counts. In a similar study done by Van Der Sande et al<sup>14</sup>showed that when a mean CD4 count of the population studied was taken mean CD4 of100 had BMI less than 18, mean CD4 of 160 had BMI of 16- 18and mean CD4 of 290 had BMI of 19-20 however normal BMI was seen in mean CD4 above 330.

## **CORRELATION BETWEEN THYROID DYSFUNCTION AND PATIENTS ONHAART**

Marco Bongiviani study revealed increased prevalence of clinical hypothyroidism in both HIV individuals on HAART and those who were not on HAART<sup>15</sup>..In our study, there is no significant correlation between thyroid dysfunction and patients onHAA

## **V. Conclusion**

- Thyroid dysfunction is found in significant association with HIV infection and a hypothyroid state occurs in HIV infection as the disease progresses.
- Males suffering from HIV show higher incidence of thyroid dysfunction.
- All individuals with CD4 count less than 200 should be screened for hypothyroidism.
- In individuals with a low CD4 count, a lower BMI is observed as compared to other patients with CD4 counts higher than them
- There is no significant correlation between thyroid dysfunction and patients treated withHAART

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